The invention claimed is:

1. A single pass analyzer for detecting the concentration of hydrogen, nitrogen, and oxygen in a sample comprising:

a furnace for fusing a sample;

a supply of carrier gas coupled to said furnace to provide an analyte stream of byproducts of fusion;

conduits defining a flow path for carrying byproducts of fusion in series through a plurality of detector and analyzer elements;

an infrared detector coupled in the flow path for detecting oxygen in the form of CO in said sample;

an infrared detector coupled in the flow path for detecting oxygen in the form of CO_2 in said sample;

a catalyst coupled in the flow path for converting hydrogen in hydrogen compounds to H_2O and CO to CO_2;

an infrared detector having an input coupled to said catalyst for detecting hydrogen as H_2O in the analyte stream from the catalyst;

a detector comprising a high sensitivity CO_2 infrared detector coupled in the flow path for detecting low levels of oxygen in the sample in the form of CO_2;

a scrubber coupled to said fourth detector, said scrubber operative to remove H_2O from the analyte stream; and

a thermal conductivity cell coupled to said scrubber for detecting nitrogen in a sample.

2. The analyzer as defined in claim 1 wherein said catalyst is copper oxide operating at about 650°C.

3. The analyzer as defined in claim 2 and further including a flow controller coupled to said conduits.

4. The analyzer as defined in claim 3 and further including a supply of carrier makeup gas coupled between said scrubber and said thermal conductivity cell.

5. A single pass analyzer for detecting the concentration of hydrogen, nitrogen, and oxygen in a sample, said analyzer including a furnace for fusing a sample, and a supply of carrier gas for sweeping an analyte stream including the byproducts of fusion through a plurality of series-coupled elements comprising:

a first infrared detector for detecting carbon monoxide from said sample;

a second infrared detector for detecting the carbon dioxide from said sample;

a heated C_uO catalyst for converting hydrogen compounds to H_2O and CO to CO_2;

a third infrared detector coupled in series directly downstream of said catalyst for detecting hydrogen compounds as H_2O;

a fourth infrared detector for detecting oxygen in the form of CO_2;

a scrubber operative to remove H_2O from the analyte stream; and

a thermal conductivity cell for detecting nitrogen in the sample.

6. A method of determining the concentration of hydrogen in a sample in the form of different hydrogen compounds comprising:

heating a specimen in a fusion furnace at temperatures increasing from room ambient to above about 1500°C;

sweeping the byproducts of fusion in an analyte stream from the furnace; and

detecting the hydrogen compounds in the analyte stream as a function of temperature to identify concentrations of specific hydrogen compounds.

7. The method as defined in claim 6 wherein said detecting step includes employing a heated C_uO catalyst to convert hydrogen compounds in the analyte stream to H_2O and providing an H_2O IR detector immediately downstream of the catalyst to detect hydrogen as a function of detected H_2O.

8. The method as defined in claim 6 wherein said compounds include H_2O, H_2, and metal hydrides.

9. The method as defined in claim 6 wherein said temperature is increased from room ambient temperature to about 2000°C.

10. A hydrogen analyzer comprising:

a fusion furnace for fusing a sample containing hydrogen;

a source of carrier gas for sweeping byproducts of fusion from the furnace in an analyte stream;

a heated C_uO catalyst coupled to said fusion furnace in the analyte stream for converting hydrogen compounds to H_2O; and

an H_2O IR detector coupled to said catalyst immediately downstream of the stream of analyte from said catalyst for detecting hydrogen in a sample.

11. The analyzer as defined in claim 10 wherein said C_uO catalyst is heated to about 650°C to convert hydrogen compounds to gaseous H_2O.

12. The analyzer as defined in claim 11 and including a furnace control for increasing the temperature of said furnace from room ambient to about at least 1500°C to speciate hydrogen, nitrogen, and oxygen compounds simultaneously.

13. A method of determining the concentration of hydrogen in a sample in the form of different hydrogen compounds comprising:

heating a specimen in a fusion furnace at temperatures increasing from room ambient to above about 1500°C;

sweeping the byproducts of fusion in an analyte stream from the furnace;

detecting the hydrogen compounds in the analyte stream as a function of temperature to identify concentrations of specific hydrogen compounds by employing a heated C_uO catalyst to convert hydrogen compounds in the analyte stream to H_2O and providing an H_2O IR detector immediately downstream of the catalyst to detect hydrogen as a function of detected H_2O;

calculating the effect of CO_2 on the level of hydrogen measured by the H_2O IR detector; and

compensating the measured hydrogen level based upon the calculating step.

14. The method as defined in claim 13 wherein said compensating step is performed by a microprocessor using a look-up table of correction factors.

15. An analyzer for determining the concentration of hydrogen in a sample in the form of different hydrogen compounds comprising:

a fusion furnace for fusing a sample;

a supply of carrier gas coupled to said furnace for sweeping the byproducts of fusion in an analyte stream from the furnace;

a C_uO catalyst to convert hydrogen compounds in the analyte stream to H_2O;

an H_2O IR detector immediately downstream of said catalyst to detect hydrogen as a function of detected H_2O; and

a microprocessor for calculating the effect of CO_2 on the level of hydrogen measured by the H_2O IR detector and compensating the measured hydrogen level based upon the calculating step.

16. The analyzer as defined in claim 15 and further including:

a detector for detecting oxygen as carbon monoxide in said sample;

at least one infrared detector for detecting oxygen as carbon dioxide in said sample;

a scrubber operative to remove H2O from the analyte stream; and

a thermal conductivity cell for detecting nitrogen in the sample.

17. A single pass analyzer for determining the concentration of hydrogen, nitrogen, and oxygen in a sample comprising:

a furnace for fusing a sample;

a supply of carrier gas coupled to said furnace to provide an analyte stream of byproducts of fusion;

conduits defining a flow path for carrying byproducts of fusion in series through a plurality of detector and analyzer elements;

a first infrared detector coupled in the flow path for detecting oxygen in the form of CO in said sample;

a second infrared detector coupled in the flow path for detecting oxygen in the form of CO_2 in said sample;

a catalyst coupled in the flow path for converting hydrogen in hydrogen compounds to H_2O and CO to CO_2;

a third infrared detector having an input coupled to said catalyst for detecting hydrogen as H_2O in the analyte stream from the catalyst;

a fourth detector comprising a high sensitivity CO_2 infrared detector coupled in the flow path for detecting low levels of oxygen in the sample in the form of CO_2;

a scrubber coupled to said fourth detector, said scrubber operative to remove H_2O from the analyte stream;

a thermal conductivity cell coupled to said scrubber for detecting nitrogen in a sample; and

a microprocessor coupled to each of said detectors and to said thermal conductivity cell for simultaneously calculating the hydrogen, nitrogen, and oxygen concentrations in a sample.

18. The analyzer as defined in claim 17 and further including a display coupled to said microprocessor for displaying the calculated concentrations.

19. The analyzer as defined in claim 18 and further including a printer for printing the calculated concentrations.